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# The Army's Evolving Science and Technology Strategy: Will It Maintain Our Technological Supremacy?

Lieutenant Colonel  
Dean W. Cash  
U.S. Army

*Faculty Research Advisor*  
Dr. Edwin R. Carlisle

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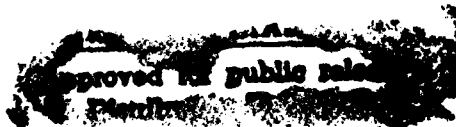


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National Defense University  
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## Abstract

### The Army's Evolving Science and Technology Strategy: Will It Maintain Our Technological Supremacy?

Author, Dean W. Cash

If we are to realize the vision of the future Army as a globally deployable strategic force the Army must maintain technological supremacy. A gargantuan task considering the dramatic conclusion to the cold war has resulted in significant reductions in defense spending and sparked debate about more severe reductions in the future. The purpose of this paper is to examine how the U.S. Army is emerging to meet this challenge through a science and technology program that has:

- greater emphasis on acquisition of knowledge over hardware.
- early and continuous involvement of Warfighters via Battlefield Laboratories.
- increased use of technology demonstrations.

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**The Army's Evolving Science and Technology Strategy:  
Will It Maintain Our Technological Supremacy?**

**INTRODUCTION**

Today's concepts of airland battle and high speed maneuver became possible only by inserting new technology into heavy armored forces. The lightning left hook of the Army's heavy divisions in Operation Desert Storm demonstrated how speed, agility, accurate fire control at high speed, infrared target acquisition, and improved armor have altered the tactics of tank warfare from the slow, cautious pace of single-target attack 30 years ago.<sup>1</sup> The key combat force multiplier in Operation Desert Storm was technological superiority.

Maintaining this technological edge has become particularly important in today's world. The proliferation of advanced technology allows potential adversaries to acquire significant combat capability with a modest investment. America's status as a world leader and as a leader in the technological revolution has raised expectations of its fighting forces. America expects and deserves a military force that is well-trained and capable of decisive victory with a minimal loss of life. As President Bush said recently, "The nature of national defense demands that we plan now for the threats on the distant horizon."

The Army finds itself in an environment where unknowns are preeminent. The 1992 National Military Strategy identifies the

- threat as "the unknown, the uncertain". For decades our challenge was to deter the massive military might of a hostile global superpower; today we face a new challenge - confronting instability and remaining prepared to respond to an unexpected crisis of unforeseen war. Instability and uncertainty are the most accurate descriptors of the current global security environment. However "unknown and uncertain" cannot form the basis for equipping our Army.

Army decision makers are in the midst of pursuing a new Science and Technology Strategy evolved over the past year that is pock-marked with uncertainty, criticism, and, of course politics. The purpose of this paper is to examine how the U.S. Army is emerging to meet changing world realities through a science and technology program that has: shifted spending priorities favoring acquisition of knowledge over hardware, expanded the role of the "user" and emphasized greater reliance on developmental demonstrators. The ultimate goal of the Army's Science and Technology (S&T) program is to provide the soldier with a winning edge on the battlefield. The accelerating pace of technological change will continue to offer significant opportunities to enhance the survivability, lethality, deployability, versatility, and expandability of Army forces. The term "emerging" is an accurate assessment of the Army's response to the New World Order.



## **NEW WORLD ORDER...**

President Bush's "New World Order", first announced on August 2, 1990, was a result of the dramatic conclusion to the cold war. President Bush referenced the changing nature of national defense and provided a course of action to meet these new demands: "To prepare to meet the challenges we may face in the future, we must focus on research--an active and inventive program of R&D."

The Secretary of Defense responded to that challenge in his statement to the House Armed Services Committee on February 7, 1991 when he said: "My overall acquisition approach for the 1990s differs markedly from the past. This will be a decade of development, more than production." This guidance lead to the Department of Defense's new acquisition strategy.

In April, 1992, before the House Armed Services Committee Subcommittees on Research and Development and Procurement, Mr. Donald J. Atwood, the Deputy Secretary of Defense, provided the following overview of the Department's new acquisition strategy. First, the Department will acquire fewer weapon systems. As a result, there will be a relative shift in DoD's development accounts distribution between advanced development and full-scale development. A commitment to the acquisition of a new weapon system will occur only when there is a definite need because of obsolescence or aging of an existing system or the new system is truly revolutionary (for example: stealth technology). Second, there will be increased reliance on research and technology development to maintain America's technology superiority. There

will be a greater use of technology demonstrators to support the development of new weapons and, unlike years past, fewer new technologies will automatically go into systems development and production.

The centerpiece of the new DoD acquisition approach is the increased investment in Science and Technology (S&T). This increased emphasis in S&T resulted in some reshuffling of responsibility within the Defense Department. Again, according to Mr. Atwood, all of the Department's science and technology efforts will be coordinated by the Director, Defense Research and Engineering (DDR&E). DoD's Director of Defense Research and Engineering further developed a framework for a DoD Science and Technology strategy. The core of this new strategy is to:

- Fuel and exploit the information technology explosion.
- Conduct extensive and realistic demonstrations of new technology applications.
- Provide for early, intensive and continued involvement of warfighters in S&T demonstration programs.<sup>2</sup>

#### **CHANGING TIMES...**

The Army intends to continue developing a wide spectrum of new technologies and to demonstrate thoroughly the capabilities of the most promising ones. Demonstration will focus on extensive testing of developmental demonstrators and prototypes. In accordance with top DoD guidance, the Army will make a basic change in its acquisition strategy by having far fewer systems selected for full-

scale development and production. This is being done because the need to produce new systems quickly and in large numbers is less now than in the past due to the collapse of the Soviet Union and hence, the absence of a superpower rival who could also field large numbers of advanced weapons.<sup>3</sup>

As a result, there is a relative shift in the Army's development accounts distribution between advanced development and full-scale development.<sup>4</sup> In order to maintain a robust technology base and demonstration-oriented program into the future, full-scale development programs will continue to decline. The Army's recent FY93-99 budget submission reflects this decline.

#### **BUDGET PRIORITIES...**

There has been a shift from procurement to technology and the Army's budget has begun to reflect spending priorities favoring acquisition of knowledge and technology over hardware. In fact the real change associated with the new strategy is budgetary--where the money is committed.

The S&T strategy provides the basic guidance for allocating resources. The funding categories 6.1, 6.2 and 6.3A are assigned to the Army science and technology program and facilitate programming, budgeting and accounting, and implementation of the strategy.

In the basic research category (6.1), the Army maintains a strong scientific base through which technological improvements to warfighting capability can be assessed and implemented. Army

scientists monitor developments in academia and industry, assess the many proposals received for 6.1 funds and select appropriate programs for funding.

The exploratory development category 6.2 represents a challenging management problem since individual research programs often support a number of identified needs. The Army addresses this challenge by linking individual research programs to the systems they support or make possible.<sup>5</sup> In turn, the systems are linked to the Army's needs as reflected in the various mission area strategies. Since research programs may readily contribute to needs in several different mission areas, the Army performs cross mission area analyses, the results of which offer insights that may warrant reordering the 6.2 funding priorities. Thus, while the initial priority order is dictated by the most critical needs in individual mission areas, the cross mission area analysis serves to incorporate a common sense overview to the process.<sup>6</sup>

The Army's 6.1 and 6.2 funding categories, which amounted to as much as 3 percent of the Army's Total Operating Authority (TOA) in the 1960's, declined steadily on a percentage basis from FY 1978 to FY 1990. Those decrements--coupled with demands to support high-priority, near-term needs--damaged program stability. This resulted in a weakened technology base and a diminished investment in the long-term future of the Army. Some needed efforts have lacked the critical mass of resources to be productive. Technology base instability threatens creative scientific and engineering effort.<sup>7</sup>

Consistent with the new emphasis on technology, the Army is working to stabilize 6.1 and 6.2 programs. The plan is to maintain funding at a minimum of zero percent real growth based on the Army's FY90 6.1 and 6.2 funding level.

The final Army S&T program funding category--6.3A portion of advanced development--provides the path for the rapid insertion of new technologies into Army systems, be they new systems or product improvements. In the 6.3A category, the Army tests components and demonstrates experimental systems to prove the feasibility and utility of the approach selected. The Army determines priorities based on the technology demonstrations, including the best of these ideas in Advanced Technology Demonstrations (ATD),<sup>8</sup> that will lead to the development of the most critically needed next generation land future systems and product improvements. Unlike the 6.1 and 6.2 programs, the 6.3A portion of the technology base is expected to fluctuate as the need for technology demonstrations and ATDs changes to meet the evolution of system needs.

There is an increased emphasis on the "fly before you buy" approach at all levels, i.e., technology demonstrations and ATDs at the 6.3A level, demonstration/validation and rapid prototypes in 6.3B, and engineering and manufacturing development (EMD) prototypes during 6.4. Thus, when the development of a new weapon system is begun, there will be more certainty that the appropriate, sufficiently mature technologies and the right requirements for program success are in place. In years past, if a high risk technology showed promise it was pushed to 6.3B and developed there

because that's where the money was. Today a promising technology will remain in 6.3A until a window of opportunity for technology insertion into next generation and future systems is presented. There is no automatic connection between the development of an advanced technology demonstrator and a decision to go into quantity production. If a go-ahead decision is made it will be made by the user!

#### **INVOLVEMENT OF WARFIGHTERS...**

To satisfy our ultimate customer, the soldier, with superior technology embodied in quality equipment requires a more proactive involvement of warfighters. The new S&T strategy requires early and continuous involvement of the user of technology. I have mentioned the "user" several times in this discussion of the S&T strategy. The "user" refers to both the combat developer and the soldier in the field, the warfighter. This strategy places great importance on the feedback of concepts and doctrine from the warfighters to the developers of the technologies and the systems. The Army's Training and Doctrine Command (TRADOC) is the organization responsible for developing requirements for the Army. Emerging from a period of known threat, an environment of analytical certainties and a fixation on the Fulda Gap, TRADOC is breaking Cold-War paradigms to focus on capabilities, rather than the threat, as the basis for requirements.<sup>9</sup>

TRADOC has identified five "Battlefield Dynamics" as the basis for this planning. The five battlefield dynamics are:

**EARLY ENTRY, LETHALITY, AND SURVIVABILITY:** The initial opposed or unopposed projection of forces or capabilities into a theater.

**DEPTH AND SIMULTANEOUS ATTACK:** The application of combat power against an enemy throughout the depth of the battlefield.

**BATTLE COMMAND:** The commander's control of the rate or pace of combat activities over time.

**BATTLESPEACE (MOUNTED AND DISMOUNTED):** The area in which opposing forces engage in combat actions.

**COMBAT SERVICE SUPPORT:** The entire spectrum of support at all echelons of command. Its overarching purpose is to generate, deploy, sustain, reconstitute, and redeploy military forces. CSS has strategic, operational, and tactical missions and focus.

Battlefield dynamics are not theoretical. They are the interrelationships of time, space and forces that have been experienced in combat and on the training fields. Revisions of operational doctrine are based upon combat lessons learned, input from the warfighting CINCs, and field exercises. In aggregate, this experience base has been focused into the battlefield dynamics.

Consistent with the new S&T strategy TRADOC has created new mechanisms to develop vision, refine the focus, and produce requirements commensurate with the changes facing the Post-Cold War Army.

#### **BATTLE LABS...**

These ideas have led to the development of "Battle

Laboratories" throughout TRADOC. Battle Labs were created to involve the Total RD&A community in TRADOC's examination of battlefield dynamics and help to make the intellectual leap between technologies and capabilities.<sup>10</sup>

Battle Labs are intended to:

- Provide a streamlined institutional means for defining requirements for the conduct of future battles.
- Furnish an organized, established setting for soldiers to experiment with new ideas and technologies.
- Permit the examination of emerging doctrine, training techniques and leadership methods, organization, and materiel, in a structured fashion and, if feasible, in this sequence.
- Create an institutionalized link between emerging technologies and warfighting ideas.
- Identify integrated solutions to PPBES activities.<sup>11</sup>

Each Battle Laboratory is developing forces using an iterative experimentation program (model-test-model) that consists of concept development, modeling, simulation and field trials that investigate impact on doctrine, training, leadership, organization, material, and soldiers. The missions of the Battle Laboratories are to implement and execute evolving FM100-5, How to Fight doctrine, in the near (1992-1998), mid (1999-2005), and far (2006-2012) terms in order to fulfill the worldwide contingency missions of the U.S. Army. The development of the Battle Laboratories reinforces the urgency of addressing the changes in battlefield dynamics. Simply



put, the Battle Lab mission is:

- . Focus on warfighting initiatives.
- . **Exploit technology.**
- . Develop issues -- conceptualize, define, integrate.
- . Seek solutions -- evaluate, experiment, integrate, prioritize.
- . Coordinate projects with other Labs and tech base organizations.<sup>12</sup>

The development of the Battle Laboratories reinforces the urgency of addressing the changes in battlefield dynamics and the impact of **emerging technologies**. The Commanding General at TRADOC, General Franks directed the Battle Labs to **link emerging technologies and warfighting concepts**, do the "what if" drills, identify leap ahead technologies and apply it to the simulated battlefield. "Did it make a difference?"<sup>13</sup>

#### **REQUIREMENTS...**

TRADOC is retaining the essence of the Concept Based Requirements System (CBRS) process; a threat-based requirements generating process that has served the Army and the nation well when we had a clear, well-defined hardware packing Soviet threat. That essence is the symbiotic relationship between concepts of how the Army will fight and requirements that enable the concepts.<sup>14</sup> Solutions must align with the Planning, Programming, Budgeting, and Execution System (PPBES) timelines. Importantly, these processes and products, though not perfect, must guarantee that projection of

future requirements and execution of solutions are not wrong. Today, the risk involved is increased because fiscal resources available for force and materiel development and equipment acquisition are reduced and will continue to decline.

The first challenge for the Warfighter is to come to grips with the allocation of resources between current military capability and **future military potential**.<sup>15</sup> Obviously, the Army is a formidable force able to meet all the strategic demands expected of it today. Many in the Army are unable or unwilling to face the fact that the greatly reduced threat of a global conflict allows a shift away from production of hardware toward research. The combat developers and warfighters can no longer rely on analytical certainties as they did in the cold war. The means of discovering requirements for the Army in a post cold war set of circumstances has got to be decidedly different from the way we looked at and discovered requirements in the past.<sup>16</sup>

Through the insistence of General Franks, TRADOC is changing how it looks at requirements. Battle Labs will facilitate the refining of requirements within the CBRS process. The CBRS still works but it requires the combat developer to alter the process. The "concept" input of the requirements process has been opened up to technology exploration and to concepts built on notional threats and notional systems.<sup>17</sup> Lists of "must haves" and "wants" are identified early in the process, but final specification of a requirement is deferred until data gathered during development, simulation, or prototyping can be factored into the decision

process.<sup>18</sup> Quite literally, the combat developer is identifying a **technology mark on the wall!** We now encourage innovation and try to make the process accessible to many players. The current bottom-up process of requirement origination is giving way to a clear strategic vision communicated from the top.

Each Battle Lab is tailored to work a defined battle dynamic. Battle Labs have been created at Ft. Knox for Mounted Battle Space and Ft. Benning for Dismounted Battle Space. Ft. Sill and Ft. Bliss have created a Battle Lab to explore the Battle Dynamics of Depth and Simultaneous Attack. Ft. Leavenworth, provides the Battle Lab for Battle Command. Finally, the battlefield dynamic of Early Entry, Lethality and Survivability, heavily dependent upon Joint action, will be explored at Ft. Monroe, to capitalize on its location amid the headquarters of sister services. Evolving technologies associated with Thrust 5, Advanced Land Combat, offer a multitude of materiel solutions that will be analyzed and guided by the Battle Labs at Ft. Knox and Ft. Benning.

Beyond the benefits manifest for the Army, Battle Labs will benefit industry by allowing for developmental work and prototyping in field conditions. Industry will be granted access to a pool of Army "thinkers" who can formulate ideas and alternative solutions. Modernization alternatives can be tested under field conditions.<sup>19</sup>

Battle Labs create an institutional link between emerging technologies and warfighting ideas to foster the intellectual leap from the technologically plausible to the development of warfighting requirements and the attainment of warfighting

capabilities.<sup>20</sup> Each Battle Lab serves as a "socket" into which interested parties "plug" their ideas, concepts and initiatives. The Army has made a significant commitment to Battle Labs, both in manpower and dollars.

#### **TECHNOLOGY INSERTIONS...**

The business of technology development has become much more complicated. It is much more difficult to apply technology rapidly to the needs of the forces in the field.<sup>21</sup> One of the tenets of the new S&T strategy is to maximize the opportunity to apply technology insertion efforts in existing equipment. Simply put, **technology insertion efforts are upgrades.** This is a practical application of technology and extends the capabilities of fielded systems. Again this a change from business as usual and the Acquisition side of R&D has been slow to make product improvement the first priority of business. The S&T community which now includes the user, working through the Battle Labs, is pushing technology insertions.

#### **FOCUS...**

Developing a technology to a fielded system takes a lot of time. Most of the systems that performed so impressively in Desert Storm were based on technology that is 17 to 20 years old. The Army's "Big 5" weapon systems--the Apache and Blackhawk helicopters, Abrams tank, Patriot missile system, and Bradley Fighting Vehicle System--which were started two decades ago, proved

themselves in Desert Storm. All these systems are a result of an Army strategy of developing options to provide for technological superiority over a single, stable and well-defined threat. To **provide the focus** for the next generation weapon systems DoD has defined seven thrusts to meet the challenging demands of an increasingly sophisticated **potential threat** around the world.

The DoD S&T Thrusts provide the framework for the Army's investment in technology for the future. The top level guidance provided to achieve the Thrusts objectives are:

- Applying the dramatic advances in information technology to enhance military capabilities,
- Involving technology users early and continuously in the development and implementation of a science and technology thrust program, and
- **Demonstrating technologies** extensively and realistically before system development is considered.<sup>22</sup>

The Army's role in and contribution to each of these Thrusts is substantial. The Thrusts have become the prime focus of Battle Labs and technology centers for the Army. The Army is the lead Service for Thrust 5, Advanced Land Combat. Emphasis on technology demonstrations and the new role for the Army's 6.3A funding is clearly demonstrated with The Advanced Land Combat (ALC) thrust. ALC consists of two top level demonstrations: Advanced Vehicle Technologies and Rapid Force Projection. The primary goals are to address known deficiencies and establish a technology road map and legacy (the idea that technology begets technology).

## TECHNOLOGY DEMONSTRATIONS...

Technology demonstrations are not new. What is new is the scope and depth of the technology demonstration, the increased importance of their role in the acquisition process and the emphasis on user involvement to permit an early and meaningful evaluation of overall military capability.<sup>23</sup>

Technology demonstrators are risk reducing, integrated, "proof of principle" demonstrations designed to assist near-term system developments in the satisfaction of specific operational capability needs. They are principally funded with 6.3A funds. Focus is on proving the utility of a technology, not that of a total operational system.<sup>24</sup> Demonstrators facilitate the integration of proposed technologies into full system demonstration/validation (6.3B funds) of engineering and manufacturing development (6.4 funds) prototype systems. They provide the link between the technology developer, program manager and program executive officer on the one hand and the Army user on the other.

Technology demonstrations are designed to permit an informed decision on the feasibility, affordability, and producability of the technology. The user determines if it is compatible with operational concepts and structure envisioned for the military purpose like the Light Combat Vehicle. This maximized flexibility and generated insights that will be applied wherever opportunity exists.

Leap ahead technologies offering revolutionary operational

capabilities will be demonstrated by Advanced Technology Demonstrations (ATDs). ATDs are a collection of technology demonstrations brought together as a "system". ATD's allow the government, contractor(s) and user to jointly assess competing technologies, potential operational capabilities and implied tactics. If the technology or capability is truly revolutionary it could transition to a fieldable prototype.

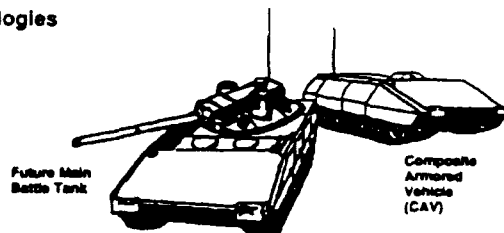
Earlier I mentioned that the Advanced Land Combat Thrust 5 consisted of two top level demonstrations (TLD), Advanced Vehicle Technologies and Rapid Force Projection. A TLD is the integration of a number of Advanced Technology Demonstrations. The selection of these two top level demonstrations was driven by known warfighting deficiencies, lessons learned from exercises and, most importantly, by recent experiences in Operation Just Cause, Desert Shield and Desert Storm. The Advanced Vehicle Technologies TLD is applicable to all ground vehicles but emphasizes improvements in capabilities of medium and heavy systems. The primary goal of this TLD is to provide superior combat capabilities at weight and sizes that enhance deployability and sustainability. No single approach will solve all the existing problems. Rather, there are several technological avenues that can contribute toward smaller, lighter and more deployable systems. Accordingly, there are advanced technology demonstrations that constitute this top level demonstration with focus on several realistic, achievable approaches. The following charts depict the relationship between TLD and ATDS.

## AVT Top Level Demonstration

### Advanced Vehicle Technologies

- Composite Structures
- Reduced Crew
- Integrated Survivability
- CAC2

Legacy:  
More Deployable  
(Lighter) "Heavy" Forces



### Top Level Demo Objectives

- Combined Arms Shared Situational Awareness (Easy Upgrade)
- Hit Avoidance Technologies to Detect Smart/Guided Threats (Start with Top Attack Supports AFAS and New Vehicles)
- Feasibility of Effective Vehicle Operation with Smaller Crews
- Structural/Ballistic Integrity, Durability, Manufacturability, Repairability of Vehicle Structures
- Made of Light Weight, High Strength Composite Materials with Integral Signature Suppression
- Evaluate Integration of Hit Avoidance, Advanced Target Acquisition and Automated/Integrated Crew Stations to show feasibility of developing a 40-50 Ton, 2-Man Future Main Battle Tank
- Provide model for FMST simulation

## COMPOSITE ARMORED VEHICLE (CAV) ATD

### VISION:

Lighter weight ground combat vehicles using advanced composites with integrated signature management.

### ATD:

Demonstration of advanced composites, signature management technology and advanced lightweight armors, on 17-22 ton platforms emphasizing manufacturability, repairability, non-destructive testing and structural integrity.

### PACING TECHNOLOGIES:

- Composites
- Signature Management
- Advanced lightweight armors
- Manufacturing technology



Composite Armored Vehicle (CAV)

### OPERATIONAL ADVANTAGES:

- Improved survivability
  - Reduced detectability
  - Improved agility
- Improved deployability
  - Reduced structure weight (Minimum 33% reduction)
- Lightweight chassis for
  - self propelled howitzer
  - mortar carrier
  - C2

The technologies that are exploited in these ATDs are derived from exploratory development programs which, in turn, build on new knowledge derived from basic research programs. This ATD program proceeded without a formal approved requirement (milestone 1) or the assumption of an eventual procurement! The Early Entry (Ft. Monroe), Mounted Battle Space (Ft. Knox) and Dismounted Space (Ft. Benning) Battle Labs contributions included advanced operational concepts, scenarios for simulation, and better developed, more



timely requirements. There is a great deal of flexibility associated with developing ATDs. What all this boils down to is a lot of "what if" drills being run on technologies that may or may not exist providing a degree of confidence generated by this ATD that will reduce risks normally associated with follow-on hardware development.

#### **WHAT IS POSSIBLE...**

We are evolving to a point where technical capabilities of soldiers and systems that the U.S. Army puts in the field will result from the interplay of two kinds of processes. On one side are the processes of scientific research and technological innovation that determine **what is possible**. On the other are a wide array of factors that affect **what is needed**.<sup>25</sup> What General Franks has implied is: If it is possible and makes a difference (changes the course of the battle or the war!), then it's needed.

The Battle Labs are the coordination points. These feedback and feed forward loops are taking place on a much expanded and integrated set of instrumented training ranges and electronic battlefields. "Synthetic environments" are being networked throughout the scientific and development communities to bring scientists, engineers, developers, manufacturers, and warfighters together to address and solve problems or take advantage of opportunities.<sup>26</sup>

#### **CRITIC'S ABOUND...**

Not everyone is a fan of this new strategy. I have already mentioned the Acquisition side has been less than enthusiastic in the support of technology insertions (upgrades). I've also heard concerns about readiness and reduced capability because this new policy would yield little operationally useful hardware for extended periods. Not true! The Army would not end up with substantial numbers of new hardware, however, the systems fielded would represent a significant capability advantage. Also, the ability to insert and upgrade 6.3A technologies directly to existing platforms will work to the soldier's advantage by providing him "state-of-the-art" hardware much quicker than the old process allowed.

Future forces will still need to be outfitted and aging stocks replaced. We have to be sure that our investment gives us the biggest bang (technology leap ahead) for our buck. We have moved (or, are moving) into an era where spending emphasizes maintaining military potential rather than current capability.

The most vocal opponents of this de-linking of prototyping from production are the defense industries. They argue this approach would simply put new technologies "on the shelf" and allow the manufacturing base to atrophy. There is a lot of hand wringing on both sides - Industry and Government - but, this is the only affordable solution!

And finally, because there is no automatic connection between the development of an ATD or prototype and a decision to go into quantity production, Congressional debate is likely to revolve

around the wisdom of spending relatively large sums of money on programs that may yield little operationally useful hardware for extended periods. For this new strategy to be viable, it would require a long term funding commitment from Congress.

#### **MONEY...**

I need to discuss **COST AND MONEY** for a moment. As indicated, earlier funding for science and technology should increase. S&T (budget categories 6.1, 6.2, & 6.3A) is not synonymous with R&D which includes 6.3B, 6.4 and 6.5 budget categories. If historical ratios continue, absolute funding for defense R&D will shrink along with the rest of the defense budget.<sup>27</sup> The DoD and the Army need to maintain the S&T momentum generated by the new S&T strategy and commit to technology investment. It does not necessarily follow that S&T investment should be reduced proportionately to R&D.<sup>28</sup>

#### **CURRENT STATUS...**

Most of what I've discussed so far has evolved over the past 14 months. The Services agreed to the Thrust concept in November 1991 and Thrust Leaders were assigned that same month. The Services' FY93-99 budgets were developed in November 1991 and altered to reflect their commitment and support of the new DoD acquisition strategy as the Program Objective Memorandum (POM) was finalized. TRADOC discussed the Battle Lab concept in January 1992 and Labs were opened for business in September 1992. The HQDA agents for the Army's technology base are actively engaged in an

input/throughput exchange loop that involves user needs, operational concepts, "technology pull", technology opportunities, demonstrations, options, analysis, plus "technology push" all working through Battle Labs.

#### CONCLUSION...

The United States Army is developing a Science and Technology strategy that will maintain our technological edge and ensure continuous modernization. It provides cost-effective evolutionary upgrades to existing systems most crucial to current readiness. Likewise, breakthrough technological opportunities will be maximized to provide leap-ahead warfighting systems.

The key elements of this strategy are:

- . a shift in budget priorities--greater emphasis on acquisition of knowledge and technology over procurement of hardware.
- . the early and continued involvement of the users of technology via TRADOC's Battle Labs providing concepts, doctrines, and military needs to the developers of technology.
- . increased importance of technology demonstrations, particularly Advanced Technology Demonstrations, in the acquisition process and decision makers' reliance on technology demonstrations to determine feasibility, affordability, and finally, battlefield advantage.

There are a number of important unresolved issues. For

example, can the Army win Congressional support for relatively expensive technology developmental packages that are not tied to specific procurement programs? Will the Army maintain its commitment to this S&T strategy or erode it as a bill-payer for future reductions and diminish our investment in the future? There are many tough questions but the Army remains engaged.

The Army's Science and Technology Strategy is an azimuth heading that, if followed, will ensure the Army's technological supremacy for decades to come. **Technology is the key to protecting our most valuable and most vulnerable asset: our most complex battlefield system--the soldier.**<sup>29</sup>

## ENDNOTES

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